THE ROLE OF MIXED DOMINANCE IN BILINGUAL ASSESSMENT

by

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ABSTRACT

The Bilingual English Spanish Assessment (BESA) is a new standardized test normed on young bilingual children who speak Spanish and English. This bilingual standardized measure is unique because it considers the possibility that children might have differential semantic and grammatical abilities across their two languages. The BESA's scoring scheme accounts for mixed dominance by allowing children to demonstrate best performance. Information on how this new measure aligns with other indices of underlying language ability, such as parent questionnaires and nonword repetition (NWR) is needed. Information of this type could lead to the development of new screening procedures. Twenty-six Hispanic Spanish/English-speaking children were recruited from Salt Lake City, Utah. Parents reported on childrens input/output in both languages and rated their Spanish and English abilities using the Speech Language Assessment Scale (SLAS). Participants were administered three nonword repetition tasks and the BESA. An English NWR task and a Spanish NWR task were administered to each child. The highest achieved score from the Spanish and English NWR tasks was used to allow for mixed dominance across languages (NWR-best). A recently developed framework was used to create a quasi-universal NWR task with quasineutral prosody with syllable patterns and phonemes in English and Spanish (NWR-U). Results of correlational and regression analyses indicated that performances across the NWR tasks were highly correlated with participants' performance on the BESA. The parent ratings from the SLAS were moderately correlated with performance on the BESA. A linear regression analysis including the SLAS, NWR-best, and NWR-U accounted for 82% of the variability in children's BESA scores. A second linear regression analysis including NWR-best and NWR-U indicated that on its own, NWR-U accounted for 85% of the variability in children's BESA scores. These findings suggest that NWR measures in general and the created quasiuniversal NWR measure in particular, show promise as potential screeners for young Spanish/English bilinguals. Parent questionnaires continue to be useful in collecting current information regarding bilingual childrens language abilities. Using NWR-U with bilingual children might represent an appealing alternative because it can account for both languages and potentially maintain high levels of diagnostic accuracy.

Para mi familia.

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CHAPTER 1

INTRODUCTION

The number of school-age children in the United States who speak a language other than English is rapidly increasing. Latinos represent 17% of the population, with over 50 million residing in the United States, making them the nation's largest minority group (U.S. Census Bureau, 2014). In 2011, 74% of Latino U.S. residents age 5 and older spoke Spanish at home, and the number of Spanish-speaking school-age children is expected to continue increasing (U.S. Census Bureau, 2014). Although the majority of these bilingual children complete their elementary education as typical learners, some do not make the expected progress in either languages with no evident cause for the delay (Kohnert, 2010). Specific language impairment (SLI) is defined as an impairment of language in the absence of hearing impairment, general developmental delay, neurological impairment and no diagnosis of autism (Schwartz, 2009). Research suggests that the prevalence of SLI may be as high as 7% among monolingual English-speaking 5-year-olds (Tomblin et al., 1997). The prevalence of SLI in young children is higher than the prevalence of autism, stuttering, and intellectual disability combined (Boyle et al., 2011). The percentage of language impaired children is expected to be at least as prevalent in other linguistically diverse populations, including Spanish/English bilingual children. It has become a particular challenge for speech language pathologists to define language discrepancies due to bilingual acquisition, or as cases of actual language impairment due to the many challenges in assessing bilinguals.

Currently, the majority of speech and language standardized tests are made with only monolingual English-speaking children in mind. English-speaking children in the early elementary years with SLI can be identified with high levels of accuracy when the grammatical morphemes past tense −ed, third person singular −s, copula and auxiliary forms BE and DO are analyzed (Rice and Wexler, 1996). Unfortunately, grammatical clinical markers do not transfer across languages. Spanish-speaking children with SLI have displayed difficulty with inflectional noun morphology while demonstrating relatively accurate usage of verb morphology when compared to age and mean length of utterance (MLU) matched peers.

This is directly opposite of what is seen in English-speaking children with SLI (Bedore and Leonard, 2001). These cross-linguistic differences in SLI grammatical symptoms between languages can be explained by typological features of the inflections. For example, children with SLI whose languages are rich in inflectional morphology will use inflections at higher rates than those children with SLI who are speaking languages that use very little inflectional morphology. In a study by Bedore et al. (2005), Spanish-speaking children with SLI used present and past tense verb inflections at higher rates than what has been reported for English-speakers with SLI. Recent research has demonstrated that Spanish-speaking children with SLI have difficulty with definite articles and direct object clitics, and these markers can serve for clinical identification purposes (Bedore and Leonard, 2001; Bedore et al., 2005).

Standardized tests made for monolinguals are not appropriate for bilingual/bicultural children because they do not adequately access the child's language skills in both languages. Bedore and Leonard (2001) defined bilingual language impairment (BLI) as the failure of bilingual children to develop language skills comparable to other children who have similar amounts of exposure in both languages. Translating English tests into Spanish is not the answer to bilingual assessment because it weakens reliability and validity of the test and does not target clinical markers of Spanish. There are several standardized tests available for Spanish-speaking children including the Preschool Language Scales-5 (PLS-5; Zimmerman et al., 2012), and the Clinical Expressive Language Function-4 (CELF-4; Wiig et al., 2006), but these tests are normed using a combination of monolinguals and bilinguals. The PLS-5 and CELF-4 were adapted from their English versions, which makes for poor content validity and potential cultural bias.

The task of creating a bilingual assessment tool is challenging because of the great variability seen in bilingual acquisition. Children can learn two languages simultaneously or can begin learning one language from birth and then acquire a second language later in childhood. Bilingual children have unique exposure to the languages they are learning, which influences performance across domains. Bilingual children can vary in their performance on semantics and morphosyntax tasks across and between languages because of the different levels of exposure in their languages (Bedore et al., 2012). This varied performance is characterized as "mixed dominance," where bilingual children's strengths in language domains can be spread across the two languages. For example, children may demonstrate higher semantic skills in English but higher morphosyntax skills in Spanish. Scoring procedures allowing for mixed dominance characteristics in children's two languages

is important to adequately assess language abilities across languages.

1.1 Bilingual English Spanish Assessment

Speech language pathologists have been presented with a new tool to assess language abilities in bilingual Spanish/English children. The Bilingual English Spanish Assessment (BESA) includes subtests in Spanish and English as well as parent/teacher questionnaires (Peña et al., 2013). The components of the BESA can adequately differentiate language impairment from a language difference in bilingual children. The language composite score classifies bilingual children ages 4 to 6 with high levels of sensitivity (92-96%) and specificity (85-92%) based on the reference standard of language sample measures, parent and teacher report, and clinical observation (Peña et al., 2013). Bilingual children are assessed in both languages and clinical markers for English and Spanish are used throughout the BESA subtests. Testing in both languages is what differentiates the BESA from other standardized measures that have been translated into Spanish or have Spanish versions. Bilingual children who have mixed dominance across language domains need to be tested in both languages to obtain representative estimates of their highest language skill levels. The BESA achieves this by testing in both languages and using the highest score obtained in either English or Spanish during scoring procedures. One important aspect of the administration of the BESA is that the administrator must be a bilingual Spanish/English speaker. In 2012, ASHA conducted a survey on SLPs providing bilingual Spanish/English services and found less than 3% of members were bilingual SLPs. This can severely limit a monolingual English speaking SLP because obtaining a translator for every screening or assessment is not feasible. Another limitation is the amount of time the BESA requires for administration. The manual suggests testing bilingual children in both languages on 2 separate days, which usually requires 45 minutes per session. Practitioners in the public schools may not have the resources or the amount of time to do a thorough assessment on all high risk bilingual children in his or her school. Several screening tools for monolingual English speaking children have been shown to have high levels of sensitivity and specificity in identifying language impairment in children. Nonword repetition tasks take very little time to administer and score when compared to standardized tests and can correctly classify children with and without language impairments (Dollaghan and Campbell, 1998). When paired with parent and teacher report, this measurement system has the potential to significantly streamline the assessment process of bilingual students for monolingual SLPs.

1.2 Parent and Teacher Report

Restrepo (1998) studied the effectiveness of different assessments of bilingual children, including language sample analyses, standardized tests, and a variety of probing measures. Results showed that the combination of parent questionnaires and language sample analysis represented the most accurate way to differentiate typically-developing Spanish/English bilinguals from Spanish/English bilinguals with language impairment. Unfortunately, because of the language barrier, collecting a language sample analysis in both languages is usually not an option for most speech language pathologists. Because of these limitations, parent questionnaires represent an attractive alternative. These questionnaires allow the parent to provide information regarding their child's language development. Restrepo (1998) found considerable evidence that parent questionnaires achieve moderate-high levels of specificity (96%) and sensitivity (74%) in identifying bilingual children with specific language impairment. Children with SLI in this study had been independently identified by ASHA-certified, Spanish/English bilingual, speech language pathologists.

A study by Rescorla (1993) demonstrated that the Language Development Survey, a parent report measure for Spanish/English speaking toddlers, ranged from 75% to 90% in sensitivity and ranged from 85% to 98% in specificity. Other studies support using parent questionnaires as suitable resource for identifying specific language impairment in bilingual children. Paradis, Emmerzael, and Duncan (2010) examined whether scores from a parent questionnaire on children's first-language development could function to differentiate typically-developing bilingual children from bilingual children with SLI. Paradis et al. (2010) found that the questionnaire was modest at differentiating groups, but showed better specificity (96%) than sensitivity (66%). The parent questionnaire correctly classified typically developing (TD) children as being TD, but did not classify the children with language impairment (LI) as LI at an acceptable rate. In order to have high level's of specificity and sensitivity, Paradis et al. (2010) recommended using the questionnaire in conjunction with other measures for the purposes of identification. Hadley and Rice (1993) designed a parent questionnaire, the Speech and Language Scale (SLAS), that is used for initial assessment, developing intervention plans, monitoring progress, and ongoing reports to parents. The SLAS differs from other parent questionnaires because it asks parents to compare their child's language abilities to an average child of the same age. Parents indicate whether their child is average, below average, or above average, when compared to their peers. The SLAS has been reviewed and tested for reliability and has been deemed a reliable tool to assist mothers in describing the language skills of their children. Weinberg (1991) reported

that the SLAS composite scores obtained from mother ratings were moderate to moderately high when compared to standardized measures (all $r > .46$, $p < .01$). Weinberg (1991) found that syntax composite scores from the SLAS correlated with two standardized measures morphosyntax, the Reynell Developmental Language Scales-Revised (Reynell, 1985) and mean length of utterance, semantic composite scores correlated with the Peabody Picture Vocabulary Test-Revised (Dunn and Dunn, 1989), and the articulation scale correlated with the Goldman Fristoe Test of Articulation (Goldman and Fristoe, 1969). A questionnaire like the SLAS can be used in conjunction with standardized tests and other measures of language in the assessment of bilingual children.

The BESA protocol includes two parent and teacher questionnaires: the Bilingual Input Output Survey (BIOS) and the Inventory to Assess Language Knowledge (ITALK). During the BIOS administration parents are asked to describe the contexts in which their children were exposed to both languages on a year to year basis. Parents and teachers are asked to report what languages children hear and use during a typical school day and weekend. This provides SLPs with a description of children's input and output in English and Spanish, which assists in determining what languages children should be tested. The ITALK requires parents and teachers to rate how children use the two languages in regards to vocabulary, grammar, sentence production, comprehension, and phonology. The ITALK also shows levels of parent and teacher concern, which can be used to design an assessment plan. The questionnaires from the BESA can be combined with screening measures to streamline the assessment process for monolingual English speaking SLPs. The SLAS is often used as a screening measure because it allows parents to describe their child's language abilities relative to their child's peers. Parent ratings of their children's speech and language often converge with professional ratings when using the SLAS (Hadley and Rice, 1993).

1.3 Nonword Repetition

Nonword repetition (NWR) is a short-term memory task, which requires children to repeat nonsense multisyllable words with increasing length. Nonword repetition tasks have been found to sufficiently differentiate monolingual English speaking children with language impairments and those children with typical language development (Dollaghan and Campbell, 1998). Several studies have shown nonword repetition performance is significantly related to grammatically complex language usage, larger vocabularies, and longer utterances (Adams and Gathercole, 1995; Adams et al., 1999). Nonword repetition tasks are useful tools in identifying language impairments because it presents a knowledge independent

test. During a nonword repetition task, children must perceive, store, recall, and reproduce phonological sequences (Summers et al., 2010). In order for nonword repetition tasks to be independent of prior language knowledge, words and syllables used must not resemble lexical items in the language (Dollaghan and Campbell, 1998). Using processing-dependent measures like NWR helps reduce test bias associated with income and education levels as well as previous language knowledge. Dollaghan and Campbell (1998) found African American children performed lower than Caucasian children of similar ages on standardized tests frequently used in assessments, but both groups performed at the same levels on their nonword repetition task. This is because the nonword measure does not require vocabulary knowledge or literacy experience like standardized tests. The study also found scoring a nonword repetition task by percent phonemes correct (PPC), dividing the number of phonemes repeated correctly by the number of target phonemes, resulted in significantly lower PPC scores for children with independently identified language impairments (LI). Using PPC allows for quick scoring procedures and an effective way to differentiate children with LI from typical language learners. Using nonword repetition tasks during assessment decreases bias when assessing monolingual English-speaking children and has the potential to do the same for bilingual children.

Kohnert et al. (2006) investigated the diagnostic accuracy of an English nonword repetition task in separating bilingual Spanish/English-speaking children with typical language from monolingual children with language impairment. The study concluded that using an English nonword repetition task was not sufficient to separate bilingual children with LI from typically developing bilingual children because the bilingual children without LI scored lower than the monolingual children without LI but scored higher than the monolingual children with LI. The level of performance seen in typical bilingual children creates many risks for misclassification and the impact of individual differences in language dominance and second language development is unknown. In a similar study, Gutierrez-Clennen and Simon-Cereijido (2010) found bilingual Spanish/English children given a nonword repetition task in only one language resulted in moderate sensitivity (80%) but poor specificity (55-61%). The study also found that when bilingual children with typically-developing language were given a nonword repetition task in Spanish and another in English, many did not achieve passing scores on one of the nonword repetition tasks. Children with LI are expected to have low scores on the nonword repetition tasks in both languages, which highlights the importance of testing bilingual children in the two languages he or she is learning. Only testing in the bilingual child's dominant language would not take mixed

dominance into account and would increase the risk of misclassification. Summers et al. (2010) investigated nonword repetition and language performance in bilingual children who had been exposed to both Spanish and English. The children in the study produced the Spanish nonwords more accurately than the English-like nonwords when measured by PPC, which possibly was due to Spanish being comprised of mostly multisyllabic words. The study found performance on nonword repetition in both English and Spanish was significantly correlated to levels of language experience in Spanish. Accuracy increased for repeating nonwords with later first exposure to English for both English F(2,48) 14 6.1, $p < 0.01$ (R^2 14 0.05) and Spanish nonwords F(2,43) 14 7.3, $p < 0.01$ (R 2 14 0.08) (Summers et al., 2010). Children who had more experience with Spanish, due to later exposure to English, repeated longer nonwords more accurately. In addition, Summers et al. (2010) found a relationship between performance on a morphosyntax task screener, which used items from the BESA, and the nonword repetition tasks. Scores from the morphosyntax tasks accounted for 22% of the variance in PPC for English and 26% for Spanish, which shows children rely on similar language-learning mechanisms to mediate these tasks (Summers et al., 2010).

Recent investigations have sought to create a quasi-universal nonword repetition task (NWR-U) to be used with all bilingual children regardless of the languages spoken. The COST Action IS0804 has sought to create a nonword repetition framework that could be used with bilingual children who speak a variety of different languages (Chiat, in press). A truly universal nonword task is not feasible because nonwords will always resemble real word phonology in one way or another. However, the framework items are described as quasi-universal because they do have some language-specific characteristics, that are more or less characteristic of different languages (Chiat, in press). Language specific properties differ greatly across languages in length, prosody, segmental constituents and their frequency, segmental combinations and their frequency, and phonetic realization of segments (Chiat, in press). An example of this variation is word length. Cantonese consists of mostly monosyllabic words, while the majority of Spanish words are multisyllabic. Phonological rules also differ across languages. Finnish does not allow consonant clusters, Hebrew only allows clusters in the onset of a syllable, and English allows for clusters in both the onset and rhyme (Chiat, in press) Although a truly universal task is not feasible, the universal framework sets out to create a template for universal nonwords to be selected based on the languages spoken by bilingual children. The framework contains 16 sets of items, with equal numbers at 2, 3, 4 and 5 syllables. The items contain a limited range of consonants /p, b, t, d, k, g, s, z, l, m, n/ and vowels /a, i, u/, combined into simple CVCV structures. This

makes them compatible with word phonology in most languages regardless of the further segmental contrasts and syllable structures that particular languages allow. The NWR-U framework attempts to account for competing demands and maximum applicability across a multitude of languages. The COST Action IS0804 project provides a unique opportunity to use nearly identical nonwords across languages.

1.4 Purpose

The present study was dedicated to expanding on previous research, and investigating the relationship between nonword repetition, SLAS and the BESA in the assessment of Spanish-English bilingual children. The following aims were addressed:

- Aim 1: To determine the associations among the best scores on the semantic, morphosyntax, and overall language composites from the Speech Language Assessment Scale (SLAS-Eng, SLAS-Span) parent ratings and the participants' best performance on the semantic subtest, morphosyntax subtest, and language index score on the BESA (BESA LIS). In order to account for mixed dominance, the SLAS protocol was administered and scored following the BESA scoring scheme by asking parents to evaluate their child's skills in both languages. To address this aim, first order Pearson product-moment correlations between each participant's best SLAS ratings (either SLAS-Eng or SLAS-Span) and their BESA scores were used.

  a. H_0: r (SLAS Semantic-Best, BESA Semantic-Best) < 0.30, $p > 0.05$ nonsignificant.
  H_1: r (SLAS Semantic-Best, BESA Semantic-Best) > 0.30, $p < 0.05$.

  b. H_0: r (SLAS-Morphosyntax-Best, BESA Morphosyntax-Best) < 0.30, $p > 0.05$ nonsignificant.
  H_1: r (SLAS-Best, BESA Morphosyntax-Best) > 0.30, $p < 0.05$.

  c. H_0: r (SLAS Overall-Best, BESA LIS) < 0.30, $p > 0.05$ nonsignificant.
  H_1: r (SLAS Overall-Best, BESA LIS) > 0.30, $p < 0.05$.

It was predicted that a significant association would be found between SLAS semantic and morphosyntax-best and BESA semantic and morphosyntax-best. This outcome would align with evidence suggesting there are strong correlations between parent report and standardized vocabulary and expressive language measures (Rescorla, 1989), which indicates parents describe their child's current language skills and use with high levels of accuracy. Restrepo (1998) found parent interview and number of errors per utterance had high rates

of sensitivity 91.3% and specificity 100% in differentiating typical and impaired language development in bilingual children when compared to groups differentiated by clinical judgement. The SLAS composites have moderate to high correlations with standardized speech and language measures (Weinberg, 1991). It was predicted that the modified SLAS, which will account for possible mixed dominance within Spanish and English, would also have high correlations with the BESA and account for more than 10% of the variability observed.

- Aim 2: To determine the associations among the participants' performances on the their best nonword repetition task (NWR-Eng, NWR-Span) and their best performances on the semantic subtest, morphosyntax subtest, and language index score from the Bilingual English Spanish Assessment (BESA). To address this aim, first order Pearson product-moment correlations between each participant's NWR-best score (either NWR-Eng or NWR-Span) and their BESA scores were used.

  a. H_0: r (NWR-Best, BESA Semantic-Best) < 0.30, $p > 0.05$ nonsignificant.
     H_1: r (NWR-Best, BESA Semantic-Best) > 0.30, $p < 0.05$.

  b. H_0: r (NWR-Best, BESA Morphosyntax-Best) < 0.30, $p > 0.05$ nonsignificant.
     H_1: r (NWR-Best, BESA Morphosyntax-Best) > 0.30, $p < 0.05$.

  c. H_0: r (NWR-Best, BESA LIS) < 0.30, $p > 0.05$ nonsignificant.
     H_1: r (NWR-Best, BESA LIS) > 0.30, $p < 0.05$.

It was predicted that a significant association would be found between NWR-best and BESA semantic-best. This outcome would align with evidence suggesting links between NWR and vocabulary learning, which are facilitated by language learning experience and age (Adams and Gathercole, 1995). Phonological working memory becomes a key role in vocabulary learning when children have less knowledge and less important when children have more practice with vocabulary learning. It is expected that children with low NWR scores would also have low BESA semantic scores and children with high NWR scores would also have high BESA semantic scores based on the relationship between phonological working memory and vocabulary development. It was predicted that a significant association would be found between NWR-best and BESA morphosyntax-best. This outcome would align with evidence suggesting phonological working memory plays a large role in storing grammatical forms, which is a possible explanation for why children with language impairments struggle with morphology, syntax, and NWR tasks (Graf Estes et al., 2007). The reported relationship between NWR and morphosyntax tasks has been strong, which suggests children that are good at manipulating morphemes, are also good at NWR (Adams and Gathercole, 1995;

Sahlen et al., 1999; Summers, 2010). It was predicted that a significant relationship would be found between NWR-best and the BESA language index score and account for more than 10% of the variability because the LIS score is comprised of both BESA semantics and morphosyntax-best scores.

- Aim 3: To determine the associations among the participants' performance on a quasi-universal nonword repetition (NWR-U) task and their best performances on the semantic subtest, morphosyntax subtest, and the language index score from the Bilingual English Spanish Assessment (BESA) and if the NWR-universal task can be used as an alternative to NWR-best. To address this aim, first order Pearson product-moment correlations between each participant's score on the universal and their BESA scores were used.

  a. H_0: r (NWR-U, BESA Semantic-Best) < 0.30, $p > 0.05$ nonsignificant.
     H_1: r (NWR-Best, BESA Semantic-Best) > 0.30, $p < 0.05$.

  b. H_0: r (NWR-U, BESA Morphosyntax-Best) < 0.30, $p > 0.05$ nonsignificant.
     H_1: r (NWR-U, BESA Morphosyntax-Best) > 0.30, $p < 0.05$.

  c. H_0: r (NWR-U, BESA LIS) < 0.30, $p > 0.05$ nonsignificant.
     H_1: r (NWR-U, BESA LIS) > 0.30, $p < 0.05$.

It was predicted that a significant association would be found between NWR-universal and the BESA measures.

- Aim 4: To determine which combination of NWR and SLAS measures best predicts participants' performance on the BESA language index score. To address this aim, regression analyses were used.

It was predicted that both shared and nonshared variance between the NWR and SLAS predictors would be observed and that a model, which combined NWR and SLAS measures would provide the best fit of the data.

CHAPTER 2

METHODS

2.1 Participants

Approval for all aspects of this study, including participant recruitment and parental consent was secured from the University of Utah Institutional Review Board prior to execution. Participant demographics are displayed in Table 2.1 and Table 2.2. Twenty-six Spanish-speaking and Spanish/English-speaking children ages 5;0 to 6;11 were recruited from charter schools and Catholic schools with high populations of Spanish/English-bilingual children. All participants resided in the Salt Lake City area in Utah. Kindergarten classrooms at participating schools were given an Institutional Review Board approved parent consent form, which was distributed to all students. The consent form described the procedures, time commitment, and volunteer status for participation in the study. Children whose parents elected to participate in the study were contacted by phone and asked to identify his/her child as a monolingual or bilingual speaker. Children who were identified as monolingual Spanish speakers or bilingual Spanish/English speakers via parent report were included in recruitment, while monolingual English speakers and trilingual speakers were excluded. Two trilingual children, a Spanish/English/Polish speaker and Spanish/English/Portuguese speaker, and a monolingual English speaker were excluded from the study.

2.2 Measures

2.2.1 Parent and Teacher Interviews

The Bilingual Input Output Survey (BIOS)-Home and Inventory to Access Language Knowledge (ITALK)-Home questionnaires from the Bilingual English Spanish Assessment (BESA), and the Speech and Language Assessment Scale (SLAS) were used for parent interviews. The BIOS-Home requires parents to describe children's language exposure history from birth on a year-to-year basis. The BIOS-Home also analyzes the current use of Spanish and English at home on an hour-by-hour basis, resulting in a percentage of Spanish input/output and English input/output (Peña et al., 2013). The ITALK-Home obtains

Table 2.1. Demographic data

Characteristic		n
Gender	Male	12
	Female	14
Mother Ed	Elementary	2
	Middle	3
	Some High	1
	High	8
	Some College	7
	College	3
	Advanced Degree	1
Spanish Dialect	Mexican	19
	Peruvian	2
	Other	5
School	Catholic Schools	9
	Dual Immersion Academy	8
	Guadalupe Charter School	3
	Referrals	6
Reduced lunch/tuition	No	10
	Yes	16
Parental Concern	No	10
	Yes	16
Sp/Lang Dx	No	23
	Yes	3
Learning Dx	No	25
	Yes	1
Current Tx	No	22
	Yes	4

Note: Mother Ed: mother's highest level of education, Sp/Lang Dx: current diagnosis of speech/language impairment, Learning Dx: current diagnosis of learning disability, Current tx: currently enrolled in treatment (resource for learning disability n=1, speech/language therapy for language impairment n=3).

Table 2.2. Demographic data continued

Characteristic	M (SD)	Range
Age (Years; Months)	5;6 (0;3)	5;0-6;0
Siblings	2 (1.27)	0-5
Birth order	2.23 (1.24)	1-6
First exp. to Eng (Years; Months)	1;8 (1;7)	0;0-5;0
SIO	47 (16.18)	9-80
EIO	53 (16.81)	20-91
ITalk Parent Rating	4.5 (0.55)	3-5
NNAT	105 (13.30)	83-129

Note SIO: average percentage of Spanish input/output, EIO: average percentage of English input/output, NNAT: Naglieri Nonverbal Abilities Test, M=100, SD=15.

information regarding children's speech and language skills in Spanish and English (Peña et al., 2013). The ITALK-Home addresses how children use Spanish and English in the five areas of speech and language development including: vocabulary, grammar, sentence production, comprehension, and phonology (Peña et al., 2013). Parents were asked to rate their children's language performance in each language resulting in a brief description of children's language use and parental concern (Peña et al., 2013).

The Speech and Language Assessment Scale (SLAS) is similar to the ITALK-Home and requires parents to rate their children's expressive and receptive language abilities in Spanish and English in comparison to other children their child's age. The SLAS is designed to identify children with delayed speech and language skills and uses a scale where parents rate the skills of their child as very low, normal for age, or very high (Hadley and Rice, 1993). Questions assess six key areas: assertiveness, responsiveness, semantics, syntax, articulation, and talkativeness (Hadley and Rice, 1993). The SLAS differs from the ITALK because parents are asked to compare their child to average children their child's age. In this study the SLAS was applied to both English and Spanish. Parents were asked to rate their child in the six areas in English and then in Spanish. Using the SLAS rating scale allowed parents to compare their child to average bilingual children instead of just describing their child's language abilities in English and Spanish.

Teacher interviews included the BIOS-School and ITALK-School questionnaires from the BESA. The BIOS-School requires teachers to describe children's language profile on an hour-by-hour basis during a typical school day (Peña et al., 2013). Children in the same classroom had the same amount of Spanish/English input but had varying outputs for each language. The BIOS-School provides percentages of children's English and Spanish input/outputs. Teachers also completed the ITALK-School, which contains the same questions as the ITALK-Home but focuses on children's Spanish and English skills at school.

2.2.2 Nonword Repetition Tasks

Three nonword repetition tasks containing nonword-like phoneme combinations for Spanish, English, and both Spanish and English were used. Each set of nonwords was developed following the phonotactic rules and characteristics of either the Spanish or English language or both languages. The Spanish nonword repetition task (NWR-Span) by Calderón (2003) contains 20 nonwords ranging from two, three and four syllables in length. The English nonword repetition task (NWR-Eng) by Dollaghan and Campbell (1998) contains 16 nonwords ranging from one, two, three and four syllables in length. During the development of the NWR-Span, nonwords similar to English were excluded to control for crosslinguistic

transfer (Calderón, 2003). The NWR-Span is similar in design and administration to the NWR-Eng, making them comparable measures. See Table 2.3 for Spanish nonwords and Table 2.4 for English nonwords. A recently developed framework created by Chiat (in press) was used to create a quasi-universal NWR task for this study. The nonwords had quasineutral prosody, comprised of commonly attested syllable patterns and phonemes across languages. Sixteen nonwords were chosen from the framework and ranged, from two, three, four, and five syllables in length and had simple CVCV structures. A nonword was determined acceptable if it contained phonemes that occur in both English and Spanish. Nonwords were excluded or modified if similarities to existing English or Spanish words were noticeable to native speakers of that language. This is one possible list of nonwords for Spanish/English bilinguals because the framework provides users with a range of nonwords to develop into specific sets. See Table 2.5 for the version of the quasi-universal task for Spanish and English bilinguals used in this study.

2.2.3 Bilingual English Spanish Assessment

The BESA consists of a pragmatics activity, Spanish phonology, Spanish morphosyntax, Spanish semantics, English phonology, English morphosyntax, and English semantics subtests. For the purposes of this study the following subtests of the BESA were used: Spanish phonology, Spanish morphosyntax, Spanish semantics, English phonology, English morphosyntax, and English semantics. The BESA's norming information is appropriate for monolingual Spanish-speaking children, monolingual English-speaking children, and bilingual Spanish/English-speaking children. The Spanish and English subtests are not translations of one another but were independently created to target language specific difficulties seen in Spanish and English-speaking children with language impairments. The BESA allows bilingual children to demonstrate their skills in both languages, which permits children with mixed dominance to be accurately assessed. The phonology subtests are designed to evaluate phonological delays in each language by using single words depicting objects and attributes familiar to children (Peña et al., 2013). Scoring considerations for Spanish-influenced English productions and other dialectical variations of Spanish and English are included in the manual. The morphosyntax subtests contain a cloze sentence completion task and a sentence repetition task for each language. The cloze task requires children to complete sentences with correct grammatical words, while the sentence repetition task requires the child to repeat sentences verbatim. The Spanish cloze task targets grammatical structures known to be difficult to children with language impairments

Table 2.3. Spanish nonword repetition (reprinted from Calderón, 2003)

Two-Syllable	*Three-Syllable*	*Four-Syllable*	
tinɾu	duɾbiɛ**pos**	xitʃɛ**ɾu**pia	xɛnburna**ɪpos**
gau**βɛɾ**	tʃ**ɛɾu**gua	**x**ɛntʃufa**ɪtin**	maʊteɪpɔ**ɪtin**
mɛɾgui	**tin**tʃau**β**ɛl	buɾda**ɪgui**pos	xiɾu**tʃɛ**pia
mɛɾfas	**ru**tʃɛtua	Xiɾutʃɛ**pos**	tiŋkaʊmie**pos**
	xusna**ɪtʃɛ**	mɛɾxan**tʃu**tin	xitʃɛɾu**pos**
		kuima**ɪxɛn**pos	

Note: Bolded sections denote stressed syllables

Table 2.4. English nonword repetition (reprinted from Dollaghan and Campbell, 1998)

One-Syllable	*Two-Syllable*	*Three-Syllable*	*Four-Syllable*
naɪb	**teɪ**vak	**tʃin**ɔɪtaʊb	vei**ta**tʃaɪdɔɪp
voʊp	**ʃoʊ**vaeg	**naɪt**ʃoʊveɪb	dae**voʊn**ɔɪtʃig
taʊʤ	vae**tʃaɪp**	dɔɪtaʊ**veɪb**	naɪ**tʃɔɪ**taʊvub
dɔɪf	**nɔɪ**taʊf	**teɪ**vɔɪtʃaɪg	tæ**va**tʃinaɪg

Note: Bolded sections denote stressed syllables

Table 2.5. Quasi-universal nonword repetition (created using framework from Chiat, in press)

Two-Syllable	*Three-Syllable*	*Four-Syllable*	*Five-Syllable*
sibu	sipula	sibalita	sibumagila
lida	banudi	mugitala	dulikasumu
nagi	nalitu	kasuluni	malusikuba
muli	luniga	lidisaku	litapimuti

Note: All syllables equally stressed

including: articles, present progressive, clitics, and subjunctive verbs (Peña et al., 2013). The English cloze task targets the following grammatical structures known to be difficult to children with language impairments: possessives, third-person singular, regular/irregular past, plural nouns, present/past auxiliary -ing, copula, negatives, and passives (Peña et al., 2013). The Spanish repetition task targets adjective agreement, relative clauses, and prepositional phrases (Peña et al., 2013). The English repetition task targets questions with inversion, relative clauses, and prepositional phrases (Peña et al., 2013). The semantic subtests consist of expressive and receptive tasks. The English and Spanish semantics subtests are administered in one language but responses in English or Spanish are scored as correct.

2.3 Procedures

All participants demonstrated normal hearing acuity during an audiometric screening and achieved a standard score of 80 or higher on the Naglieri Nonverbal Achievement Test (Naglieri, 2003). Participating children completed the Bilingual English Spanish Assessment and the three following supplemental tasks: Spanish nonword repetition, English nonword repetition, and universal nonword repetition. In addition, parent and teacher interviews were conducted in person or over the phone. The procedural sequence for testing and interviews is presented in Figure 2.1.

2.3.1 Parent and Teacher Interviews

All questionnaires were administered by the primary investigator, a Spanish/English bilingual, in the language preference of the participating parents. Parents of participating children were interviewed over the phone to complete the BIOS-Home. Averaged Spanish and English input/output scores were calculated from information reported and determined the language or languages of testing. Following the BESA protocol, children who had an average input/output score ranging from 0-29% in Spanish were tested in only English and children who had an average input/output score ranging from 71-100% in Spanish were tested in only Spanish. Children who had an average of 31-70% input/output score in either Spanish or English were tested in both English and Spanish and required two separate 1.5-hour testing sessions. The ITALK-Home was administered over the phone before or during the initial testing session. The SLAS was administered in an interview format with the parent during the first or second scheduled session. The highest scores were then taken from each language to determine SLAS composite scores.The ITALK-Home was similar to the SLAS and the two questionnaires were separated by several days to reduce repetitiveness

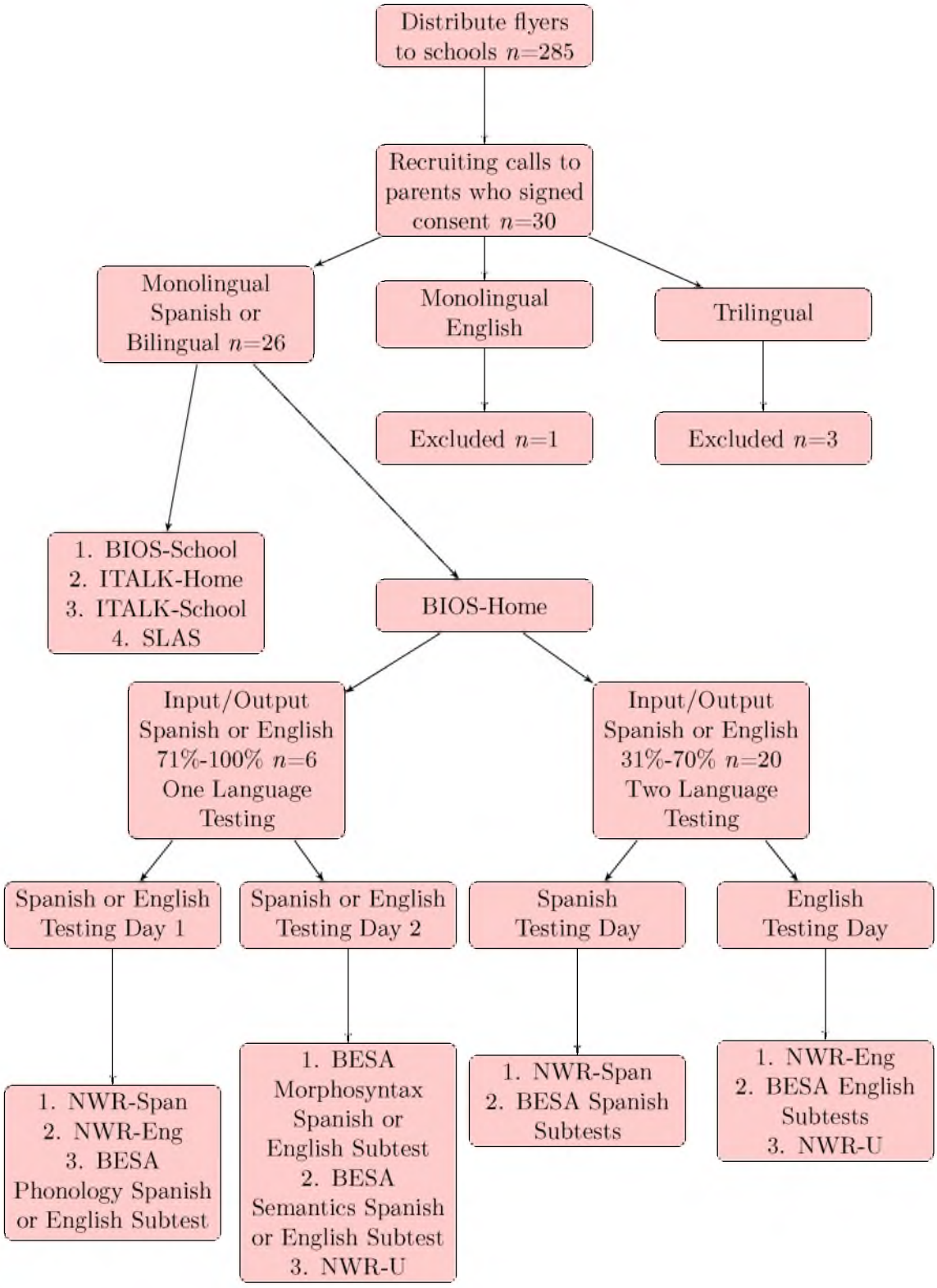

Figure 2.1. Recruitment and testing procedural sequence.

for participating parents.

Teacher interviews took place after all participants from a single classroom had completed testing to alleviate interview workload for teachers. The percentages from the BIOS-School can be combined with the BIOS-Home to determine language of testing; however, the BIOS-School did not determine language of testing. Students had completed testing based on only the BIOS-Home results.

2.3.2 Nonword Repetition Tasks

The nonword repetition tasks were administered, scored, and analyzed by the primary investigator. The NWR-Span, NWR-Eng, and NWR-universal were prerecorded and administered to all children via headphones. All children were given English, Spanish, and universal NWRs regardless of the results of the input/output scores from the BIOS-Home. Instructions were given in the target language for the language specific NWRs and in English for the universal NWR.

The language specific nonword repetition tasks were transcribed and scored by listening to children's responses from the audio recording and following scoring procedures set by Dollaghan and Campbell (1998). Productions were scored as incorrect if children omitted or substituted target phonemes. If syllables were omitted, the remaining syllables were matched to the target syllables and scored as phonemes for that target syllable, while omitted phonemes were scored as incorrect. Distortions and additions were counted as correct. The total number of correct phoneme targets were divided by the total number of phoneme targets resulting in percent phonemes correct (PPC). PPC was calculated for each syllable length and each syllable length was averaged together for the total PPC of each language. This resulted in PPC for the entire set of nonwords for the NWR-Eng and the NWR-Span score. The highest obtained language specific PPC score was identified and each participant had a NWR-Span PPC score, NWR-Eng PPC score, and NWR-best PPC score.

The quasi-universal nonword repetition tasks was scored following procedures set by Chiat (in press) and Dollaghan and Campbell (1998). To provide for direct comparisons, the NWR-U was scored using percent phonemes correct instead of whole word correct. The NWR-U scoring followed the same procedures for NWR-Span and NWR-Eng except allowances were made for segmental substitutions that were relatively consistent in the child's speech (e.g., stopping of fricatives) and segmental substitutions that were consistent with the child's accent/dialect (e.g., /ae/ for /a/) (Chiat, in press).

2.3.3 Bilingual English Spanish Assessment

The Spanish subtests, English subtests, or both Spanish and English subtests of the BESA were administered based on children's language input and output exposure results from the BIOS-Home. The BESA was administered and scored by the primary investigator using guidelines from the manual. All sessions were audio recorded for scoring purposes. A total of six sets of scaled and standard scores were derived from the English and Spanish subtests: phonology, morphosyntax, and semantics. Three children were only tested in one language and received only three sets of scores. These participants did not have enough input/output to either Spanish or English for two language testing. Children tested in both languages received six sets of scores from the Spanish and English subtests and the best standard score from each set of subtests was identified. The best subtest standard score from the morphosyntax and semantics subtests was weighted to create the language composite score. The language composite score for children tested in only Spanish or English was derived from the weighted standard scores from the Spanish morphosyntax and semantic subtests. The language composite score has been shown to have excellent classification accuracy with high levels of sensitivity (92-96%) and specificity (85-92%; Peña et al., 2013).

2.4 Reliability

Data for the study were collected by the primary investigator, a bilingual Spanish/English graduate student in the University of Utah speech-language pathology program. Recordings of children's responses were collected during the administration of the language measures, then used to transcribe children's responses offline, and to check the accuracy of online scoring of test protocols. A second bilingual graduate student listened and scored 10% of the language measures, which were randomly selected. Scoring consistency was calculated using the number of individual scored test items in agreement divided by the total number of items in agreement plus the total number of items in disagreement. This yielded the following interrater reliability percentages: universal nonword repetition: 96%; Spanish nonword repetition: 90%; English nonword repetition: 90%; and BESA: 99%.

CHAPTER 3

RESULTS

3.1 Parent Surveys and the BESA

Complete data were available for all participants. Means, standard deviations, and ranges associated with the study sample across the BESA, NWR, and SLAS measures are provided in Table 3.1. Observed standard deviations and ranges confirmed that there was sufficient variability across measures to examine potential associations between measures.

Pearson product-moment correlations between the SLAS morphosyntax-best, the SLAS semantics-best, and the SLAS overall-best composite scores with the BESA measures were used to address the first research aim. As indicated in Table 3.2, parent ratings of children's linguistic proficiencies on the SLAS measures were low-moderately correlated with their performance on the BESA measures (r range: 0.288 to 0.642) and statistically significant at p <.001 (two-tailed). The SLAS morphosyntax-best rating had the highest correlations with performance on the BESA measures (r= 0.570-0.642) and the SLAS overall-best composite had similar but slightly lower correlations (r= 0.534-0.619). The SLAS semantics-best ratings had the lowest significant correlations with performance on the BESA (r= 0.288-0.305). These results provided support for the prediction that the SLAS measures would demonstrate high-levels of associations between parent ratings on linguistic ability and performance on the BESA composite scores and account for more than 10% of the variability, most notably for the SLAS morphosyntax-best and SLAS overall-best composite scores.

3.2 Nonword Repetition and the BESA

Pearson product-moment correlations between the Spanish, English, Best, and Universal NWR tasks to the BESA morphosyntax subtest, semantic subtest, and language index score were used to address the second research aim and are presented in Table 3.3. Associations between the NWR and BESA measures were all moderate-high in magnitude and statistically significant at p <.001 (two-tailed) and accounted for 43%-76% of the variability.

Table 3.1. Measure performance

Measure	M (SD)	Range
BESA Morph	99 (15.70)	58-118
BESA Sem	108 (12.46)	78-128
BESA LIS	103 (13.50)	71-120
NWR-Eng	75 (13.93)	29-91
NWR-Span	79 (12.76)	51-98
NWR-Best	81 (11.86)	51-98
NWR-U	87 (10.54)	51-97
SLAS Morph-Best	4 (1.44)	2-7
SLAS Sem-Best	4 (1.25)	3-7
SLAS Overall-Best	4 (1.28)	3-7

NNAT: Naglieri Nonverbal Abilities Test; NWR-Eng: English Nonword repetition; NWR-Span: Spanish nonword repetition; NWR-Best: Best nonword repetition from English or Spanish; NWR-U: Universal nonword repetition; BESA Morph-Best: morphosyntax composite from Bilingual English Spanish Assessment; BESA Sem-Best: semantics composite from Bilingual English Spanish Assessment; BESA LIS: language index score from Bilingual English Spanish Assessment.

Table 3.2. Correlations between SLAS measures and BESA measures

Measure	SLAS Morph-Best	SLAS Sem-Best	SLAS Overall-Best	BESA Morph	BESA Sem	BESA LIS
SLAS Morph-Best	1.000	.764**	.920**	**.642****	**.570****	**.639****
SLAS Sem-Best		1.000	.793**	**.289**	**.288**	**.305**
SLAS Overall-Best			1.000	**.619****	**.534****	**.603****
BESA Morph				1.000	.818**	.962**
BESA Sem					1.000	.940**
BESA LIS						1.000

**p <.01 SLAS Morph-Best: best morphosyntax composite from SLAS English or Spanish; SLAS Sem-best: best semantics composite from SLAS English or Spanish; SLAS Overall-Best: best total composite from SLAS English or Spanish; BESA Morph: morphosyntax composite from BESA; BESA Sem: semantics composite from BESA; BESA LIS: language index score from BESA.

Table 3.3. Correlations between NWRs and BESA measures

Measure	NWR-Eng	NWR-Span	NWR-Best	NWR-U	BESA Morph	BESA Sem	BESA LIS
NWR-Eng	1.000	.783**	.882**	.869**	**.871****	**.760****	**.865****
NWR-Span		1.000	.957**	.781**	**.816****	**.652****	**.779****
NWR-Best			1.000	.829**	**.863****	**.718****	**.837****
NWR-U				1.000	**.864****	**.733****	**.845****
BESA Morph					1.000	.814**	.962**
BESA Sem						1.000	.940**
BESA LIS							1.000

**p <.01 Note: NWR-Eng: English Nonword repetition; NWR-Span: Spanish nonword repetition; NWR-Best: Best nonword repetition from English or Spanish; NWR-U: Universal nonword repetition; BESA Morph: morphosyntax composite from Bilingual English Spanish Assessment; BESA Sem: semantics composite from Bilingual English Spanish Assessment; BESA LIS: language index score from Bilingual English Spanish Assessment.

Correlations between the participants performance on the morphosyntax subtest and their performances on the English NWR (r=0.871), Spanish NWR (r=0.816), BEST NWR (r=0.863) and the Universal NWR (r=0.864) were relatively higher than the correlations between the NWR measures and performance on the semantic subtest (r= 0.652-0.760) and the Language Index composite (r=0.769-0.864). English NWR had the highest levels of association with the BESA measures (r= 0.760-0.873), followed by the Universal NWR (r= 0.733-0.861), and then the NWR-Best (r= 0.779-0.865). In relation to other measures, the Spanish NWR had the lowest correlation with the participants performance on the BESA measures (r=0.652-0.816) but was still in the moderate/high range. As predicted, these results indicated high-levels of association between participants performance on the NWR measures and the BESA composite scores, particularly for the English NWR and the morphosyntactic scale.

3.3 Regression Analyses

A linear regression analysis was conducted to evaluate aim three, whether the participants' language index score on the BESA could be predicted by combining their performances across the NWR-universal, NWR-best, SLAS semantics-best, SLAS morphosyntax-best, and SLAS overall-best composite. The BESA language index score served as the dependent variable and the NWRs and SLAS measures served as the independent variables. A significant regression equation was found using a block input approach F (5, 20)= 16.87, p <.001). The regression equation was:

$$\begin{aligned} LIS = {} & NWRU(0.620) + NWRBest(0.384) + SLASmorphBest(-0.559) \\ & + SLASsemBest(1.26) + SLASoverallBest(0.487) \end{aligned} \tag{3.1}$$

Bivariate correlations associated with these variables are shown in Table 3.4. The regression analysis showed that NWR-U (β=0.620, p <.005), NWR-best (β=0.384, p <.047), SLAS morphsyntax-best (β= -0.559, p <.097), SLAS semantics-best (β=1.26, p <.522), and SLAS overall-best composite (β=0.487, p< .076). This combination of variables significantly contributed to the prediction of the BESA LIS. The overall model fit was R^2= 82%. The NWR-U accounted for the majority of the variance (62%), while the best SLAS semantics accounted for the least amount of the variance, and the best SLAS morphosyntax was negatively correlated to the language index score. These results provided support that a model combining NWR and SLAS measures could predict the participants' language index score on the BESA.

Table 3.4. Linear regression for BESA language index

Variable	**B**	**SE(β)**	β	t	**Sig.(p)**
Constant	-11.321	17.056		-.664	.514
NWR-U	.820	.257	.620	3.193	.005
NWR-Best	.449	.212	.384	2.117	.047
SLASmorph-Best	-5.337	3.065	-.559	-1.741	.097
SLASsem-Best	1.429	2.194	.126	.651	.522
SLASoverall-Best	5.275	2.816	.487	1.874	.076

Note: NWR-U: universal nonword repetition, NWR-Best: best nonword repetition from English or Spanish, SLASmorph-Best: best morphosyntax composite from SLAS English or Spanish, SLASsem-Best: best semantics composite from SLAS English or Spanish, SLASoverall-Best: best total composite from SLAS English or Spanish.

A second linear regression analysis was conducted to evaluate if the NWR-universal could be used as an alternative to NWR-best to predict the participants' language index score on the BESA. The BESA language index score served as the dependent variable and the two NWRs served as the independent variables. The NWRs were entered into a stepwise regression using a forward input approach. Results of the regression analysis are displayed in Table 3.5. Model 1 consisted of NWR-U and model 2 consisted of both the NWR-U and NWR-best. Model 1 found that NWR-U (β=0.848, p <.001) significantly predicted the BESA LIS. The overall model fit was R^2= 72% with the NWR-U accounting for 85% of the variance. Model 2 indicated that NWR-U (β=.493, p <.010) and NWR-best (β=.428, p<.033) and together, NWR-best and NWR-U, accounted for 77% of the variability in childrens BESA scores. Addition of the NWR-best in model 2 did significantly improve prediction (R^2 change= .057, F change= 5.912, p = .023). These results indicated that the value of including NWR-best in the model, although significant was modest.

Several analyses were completed in addition to those which addressed the primary research questions directing this study. The following section contains supplemental analyses.

3.4 Supplemental Analyses

3.4.1 Mixed Dominance Across Language Domains

The BESA considers a child mixed dominant if the derived best morphosyntax and best semantics standard scores come from different languages. Applying this criteria to the study sample indicated that out of the 26 participants, 38% of the children were considered mixed dominant; 50% were English dominant, and 12% were Spanish dominant (see Figure 3.1). Additional domains of language were addressed other than morphosyntax and semantics through the use of nonword repetition tasks and the phonology subtest of the BESA. When the languages associated with individuals best scores from the English and Spanish nonword repetition tasks and all BESA subtests (i.e., phonology, morphosyntax, and semantics) were considered, the rate of mixed dominance across the different language measures increased (see Figure 3.2). Out of the 26 participants 73% met the expected criteria for mixed dominant; 12% were Spanish dominant and 15% were English dominant. This meant that only a very small proportion of participants had all of their best scores in only English or only Spanish across tasks. These findings suggest that as the areas of language domains becomes more diverse, bilingual children must tap into both their English and Spanish languages to demonstrate their highest achievable language abilities. See appendix A for a breakdown of individual profiles.

Table 3.5. Linear regression for NWR models

Model		B	SE(β)	β	t	Sig.(p)
1	Constant	5.762	12.506		.461	.649
	NWR-U	1.122	.143	.848	7.852	.000
2	Constant	5.830	11.394		.512	.614
	NWR-U	.652	.233	.493	2.800	.010
	NWR-Best	.502	.206	.428	2.431	.023

Note: NWR-U: universal nonword repetition, NWR-Best: best nonword repetition from English or Spanish

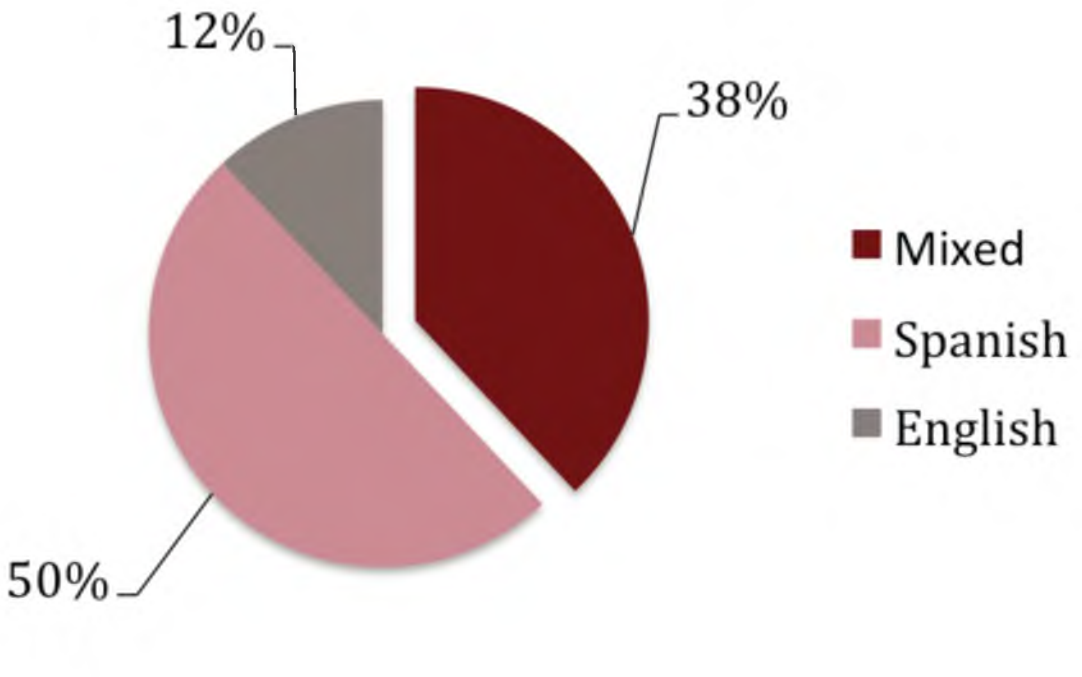

Figure 3.1. Occurrence of mixed dominance among BESA semantics and morphosyntax subtests

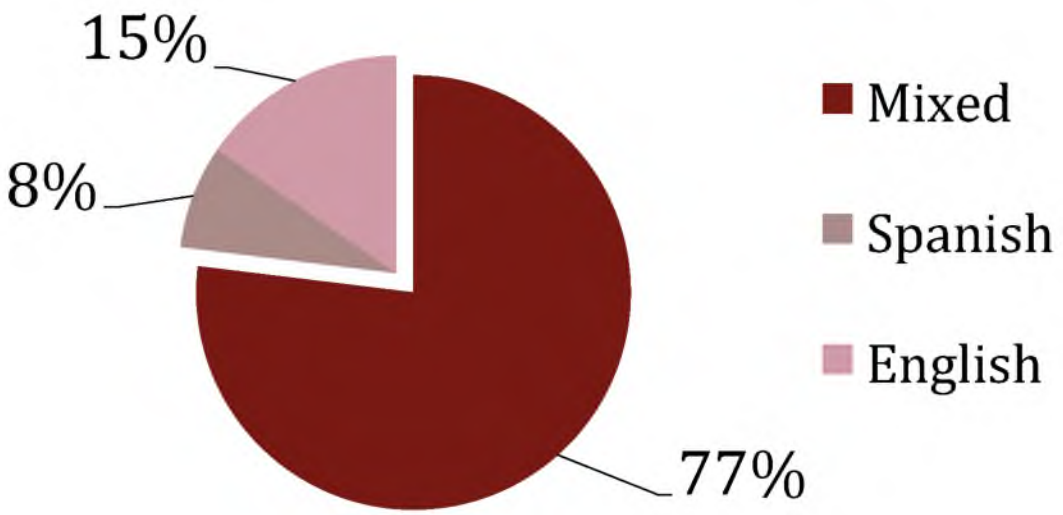

Figure 3.2. Occurrence of mixed dominance among nonword repetition measures and BESA phonology, semantics, and morphosyntax subtests

3.4.2 Identifying Dominance

Determining a bilingual child's dominance through parent report is still a common practice despite research noting its limitations. For the last 20 years research has demonstrated that bilingual children's language knowledge is likely to be distributed across two languages. In the current study, parents rated children's Spanish and English speech and language using the Inventory to Access Language Knowledge from the BESA. The highest average rating was Spanish or English and most parents rated their child higher in all domains in one language. If the ITALK was used to determine dominance and language of testing, 19% of the children would be classified balanced bilinguals and tested in both languages, 27% would have been Spanish dominant and tested in only Spanish, and 54% would have been English dominant and tested in only English (see Figure 3.3). The results of testing differed greatly from the parent ratings for language proficiency. Only 1 parent correctly predicted their child as Spanish dominant, 3 parents correctly identified their children as English dominant, and 22 parents incorrectly predicted their childs dominance (see Figure 3.4). When analyzing the parents' perception of their childs language proficiency, only 4 out of 26 (15%) predictions matched their child's performance.

3.4.3 Alternative Scoring for Nonword Repetition

Nonword repetition tasks can be scored using either percent phonemes correct or whole nonword correct. Percent phonemes correct was used during data analysis to allow for comparisons with the existent literature but scoring based on whole nonword accuracy would be much easier to use clinically (Chiat, in press). Pearson product-moment correlations were used to analyze the whole nonword correct scoring of nonword repetition tasks to the BESA. The Spanish, English, Best, and Universal NWR tasks were compared to the BESA morphosyntax subtest, semantic subtest, and language index score and are presented in Table 3.6. Associations between the NWR and BESA measures were all moderate-high in magnitude and statistically significant at p <.001 (two-tailed). Correlations between the participants' performance on the morphosyntax subtest and their performances on the NWR-Eng (r=0.759), NWR-Span (r=0.503), NWR-Best (r=0.737) and the NWR-U (r=0.731) were relatively higher than the correlations between the NWR measures and performance on the semantic subtest (r= 0.493-0.662) and the Language Index composite (r=0.769-0.864). NWR-Eng had the highest levels of association with the BESA measures (r= 0.570-0.759), followed by the NWR-Best (r= 0.637-0.737, and then NWR-U (r= 0.662-0.732). NWR-Span had the lowest correlation with the participants' performance on the BESA measures (r=0.493-0.528).

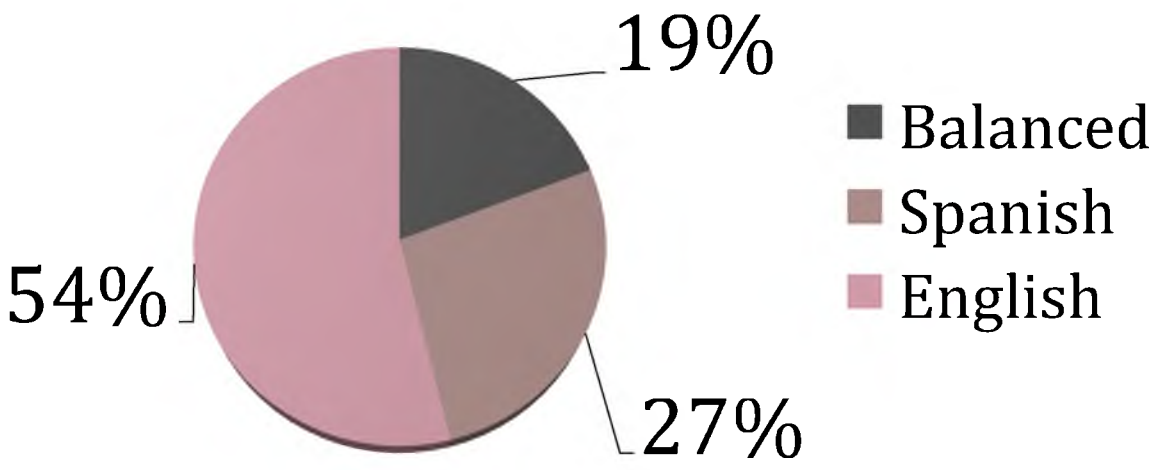

Figure 3.3. Parent rating of language skills. Can we use the highest rated language to determine language of testing?

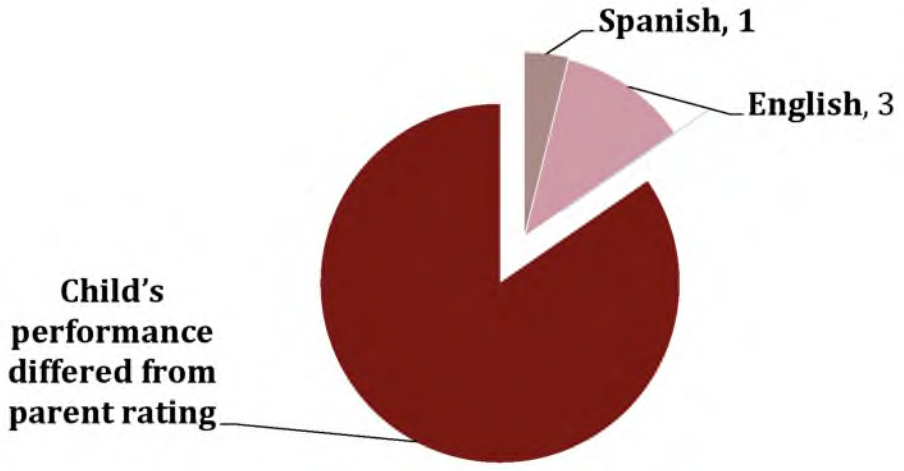

Figure 3.4. Congruence between parent ratings of children's Spanish and English and performance standardized/nonstandardized language measures

Table 3.6. Correlations using whole nonword correct NWRs scores

Measure	NWR-Eng	NWR-Span	NWR-Best	NWR-U	BESA Morph	BESA Sem	BESA LIS
NWR-Eng	1.000	.311	.793**	.420*	**.759****	**.570****	**.707****
NWR-Span		1.000	.721**	.498**	**.508****	**.493***	**.528****
NWR-Best			1.000	.548**	**.731****	**.637****	**.722****
NWR-U				1.000	**.731****	**.662****	**.732****
BESA Morph					1.000	.818**	.962**
BESA Sem						1.000	.943**
BESA LIS							1.000

**p <.01 Note: NWR-Eng: English Nonword repetition; NWR-Span: Spanish nonword repetition; NWR-Best: Best nonword repetition from English or Spanish; NWR-U: Universal nonword repetition; BESA Morph: morphosyntax composite from Bilingual English Spanish Assessment; BESA Sem: semantics composite from Bilingual English Spanish Assessment; BESA LIS: language index score from Bilingual English Spanish Assessment.

These results indicated high-levels of association between participants' performance on the NWR measures using percent whole nonword correct scoring and the BESA composite scores, which were comparable to outcomes using percent phonemes correct. The levels of association encourage further study into the possibility of using whole word correct scoring in the clinical context.

CHAPTER 4

DISCUSSION

This study examined the relationship between participants' best performance on nonword repetition, best parent report and the Bilingual English Spanish Assessment in the evaluation of Spanish-English bilingual children. It was hypothesized that parent ratings on the Speech Language Assessment Scales would be associated with the children's performance on the BESA semantics and morphosyntax subtests and the language index score. Likewise, it was expected based on previous studies that nonword repetition tasks, both language specific and quasi-universal, would be associated with the BESA measures. This would provide support for the use of best parent report and best nonword repetition as possible screening tools with a very challenging but growing population.

The SLAS ratings were moderately correlated with BESA performance, with variation across the different BESA subtests. In contrast, performance on the nonword repetition tasks was consistently highly correlated with performance on the BESA measures. The moderate correlations from the SLAS ratings may have been due to parental expectations of typical bilingual language development as most of the parents learned Spanish in a monolingual environment. The level of association among the NWRs performance and the BESA performance was surprisingly high, especially among the English and Spanish NWRs. As a group, the participants had relatively more exposure to English than Spanish and had attended at least 1 year of preschool in English prior to kindergarten. These group demographics may have contributed to the higher levels of performance on the English nonword repetition task. The quasi-universal NWR performance also had high associations with the BESA performance. These results show promise in the use of this new NWR measure that accounts for English and Spanish.

All the measures used in this study accounted for mixed dominance via scoring schemes modeled after the BESA. Mixed dominance occurred within one measure, the BESA, in 9 out of 26 participants (35%). The individual profiles of all measures demonstrated an increase in the occurrence of mixed dominance with an increase in language measures/tasks.

The observed rate of mixed dominance in this study sample was relevant clinically because speech language pathologists rarely evaluate one domain of language during an assessment. Bilingual children can be expected to display mixed dominance across and within language domains depending on how measures tap into children's metalinguistic knowledge. Mixed dominance plays a pivotal role in diagnostic decision making for bilingual children and should always be considered before qualifying children for services.

4.1 Parent Surveys

The parent ratings on the SLAS were moderately correlated with BESA performance. Parents were administered the SLAS questions twice; the first administration parents rated their child's Spanish skills and on the second administration the parents rated their child's English skills. The parents rated their child's language abilities compared to other typically developing bilingual children of the same age and the highest ratings were identified for best SLAS scores. The SLAS morphosyntax-best, semantics-best, and SLAS overall-best composites varied in levels of association with BESA performance. The morphosyntax-best composite had the highest associations among the three composites. The overall-best had moderate associations, which were lower than the morphosyntax-best associations and the semantics-best composite had the lowest associations with the BESA performance. This was surprising because of the high associations found in the Pearson-product correlations. It could be the case that the parents rated their children consistently below their actual abilities because their expectations had been set to adult monolingual Spanish grammar standards. The children in this study were learning Spanish and English grammar in a bilingual context, whereas most of the parents acquired Spanish in a monolingual context. Despite asking parents to rate their children compared to other bilingual children, it is possible that parents still underestimated their child's grammatical development in both languages. The SLAS is a seven-point scale with four being average. Most of the parents rated their children as average in all domains of language in either Spanish or English. It was typical for the parents to consistently rate their child higher in one language. Many parents were surprised at their child's level of knowledge in English or Spanish because they typically do not observe their child during structured testing contexts. The SLAS overall-best made the largest contribution to the variance in the regression model predicting the BESA language index score. Although the parents typically rated their children as average in their best language it appears the parents underestimated their children's morphosyntax and semantic abilities. These results indicate that parent report

using the SLAS-overall-best was a better predictor of performance on the BESA than using only the SLAS morphosyntax-best or SLAS semantics-best.

4.2 Nonword Repetition

All three nonword repetition tasks were highly correlated with the participants' BESA performances. As seen in previous bilingual research using Spanish and English NWR tasks (Calderon, 2003; Summers, 2010), as a group the participants scored higher in one language, Spanish. In the current study, the majority of the children had more hourly exposure to English on a day-to-day basis than Spanish. It is also important to note that all the participants had attended at least 1 year of preschool in English prior to kindergarten. Calderón (2003) and Summers (2010) also observed higher NWR scores in Spanish in children ranging from 4;6 to 6;0 years of age. These results are surprising because the English NWR performance had the highest associations with the performance on the BESA measures. Out of the 26 participants, 19 had Spanish as their best NWR score, 6 had English as their best NWR score, and 1 achieved the same scores on both the Spanish and English NWRs. Research has shown that bilingual children perform better than monolinguals when repeating longer syllables due to their experience with multisyllabic words in Spanish. It could be the case that exposure to Spanish, since birth in most cases, caused the majority of the children to do better in the language in which they had the longest amount of exposure. Summers (2010) explained better repetition of Spanish nonwords to using phonological working memory systems more effectively to repeat Spanish nonwords. Spanish phonological systems are mastered earlier than English because of fewer phonemes and contrasts in the sound inventory. This explains why Spanish is considered a multisyllabic language, because fewer phonemes allows for longer CV combinations due to fewer phoneme options (Summers, 2010). The phonetic inventory of Spanish, which has fewer options for CV syllables, may decrease the amount of memory load compared to the English phonetic inventory (Summers, 2010).

Although the participants demonstrated a trend in their best language of performance, it was still necessary to assess nonword repetition skills in both English and Spanish. If only English NWR skills were assessed many of the children would not have been able to demonstrate their best achievable score. The NWR-best accounted for the variation of Spanish and English best NWR scores. The highest score was identified from the two language specific NWR tasks and all NWR-best scores were compared to BESA performance. NWR-best was less correlated than the English and Spanish NWRs but still highly associated with

BESA subtests and language index score. The associations with the BESA morphosyntax performance and NWR was much higher than BESA semantics performance. These findings are consistent with previous research (Adams and Gathercole, 1995; Sahlen et al., 1999; Summers, 2010) and demonstrate that bilingual children referenced similar linguistic skills or knowledge to complete both tasks. In order to account for mixed dominance, both languages must be assessed and the NWR-best allowed the participants to demonstrate their highest achievable NWR skills. This shows promise for using best scores from language specific NWR tasks as part of assessment or screenings.

A quasi-universal nonword repetition task was used in this study to investigate the associations of a nonlanguage specific task and its associations with performance on the BESA measures. NWR-U was significantly and highly correlated with the BESA measures and was nearly as correlated as the NWR-best performance. A regression analysis using a forward input approach revealed that the NWR-U accounted for 80% of the variance in the BESA LIS on its own. These results are not only impressive but helpful for the assessment of bilingual children. The quasi-universal task is not specific to one language but accounts for phonetic and phonotactic rules of both Spanish and English. Administration of one NWR rather than two language specific NWRs saves the examiner time and alleviates the amount of work required by children. It is important to note that the NWR-U was easier to score online and to transcribe from audio recordings. This was due to the nonwords construction of CV syllables with no consonant clusters and a balanced amount of phonemes. Transcription of nonwords was simple because each consonant was separated by a vowel, which made omissions and substitutions easier to identify. Scoring of universal nonwords was also less daunting because each nonword had an even number of phonemes, which made percent phonemes correct calculations simple. The quasi-universal NWR task shows great promise for routine use during assessment of bilingual children because the feasibility of administration and associations with the BESA.

4.3 Mixed Dominance

Mixed dominance occurs when bilingual children vary in their performance across and between languages due to different levels of exposure in their first and second language (Bedore et al., 2012). Bilingual children's strengths across language domains can be spread between the two languages. The occurrence of mixed dominance was observed in the administration of the BESA, where some participants demonstrated higher semantic skills in English but higher morphosyntax skills in Spanish and vice versa. Testing in both languages

is crucial when assessing bilingual children because mixed dominance can and most likely will occur. In the present study, scoring procedures allowing for mixed dominance characteristics in children's languages was implemented and based on the scoring scheme of the BESA. The best scores were identified from the different measures of speech and language and mixed dominance occurred within each task. The results from this preliminary small scale study show the importance of testing in both languages. Testing in one language, either the child's home language or in the majority language, would not have been sufficient because it did not capture the true language capabilities of most bilingual participants. Testing in one language only of bilingual children is not appropriate, especially if the standardized measure is normed on monolingual speakers of Spanish or English. The ASHA Code of Ethics (2010) states that SLPs are obligated to provide culturally and linguistically appropriate services to their clients and patients regardless of the SLP's own culture or language.

All of the participants attended preschool in English and the majority of the children had more daily exposure to English due to their enrollment in kindergarten. Even though the group had been in English language classrooms for 2 or more years, mixed dominance was still observed in the majority of the participants. There were several children attending a dual immersion academy, which had 90% Spanish language input from teachers during an 8 hour school day. These participants lived in Spanish speaking households and attended a Spanish speaking classroom, but still demonstrated mixed dominance across language domains. The metalinguistic knowledge of bilingual children was not equally distributed between English and Spanish, but scattered and spread across the different domains of language. Speech language pathologists need to consider how often mixed dominance occurs and integrate this knowledge into the assessment and differential diagnosis of bilingual children.

4.4 Limitations and Future Directions

The present study had limitations that should be addressed in future investigations. The main goal of recruitment was to enroll typically developing bilingual children. Bilingual children with language disorders were not deliberately sought but were also not excluded from the study sample. The relative representation of LI cases in this study sample was consistent with the expected levels based on epidemiological reports (Tomblin et al., 1997). Larger scale studies which include a clinical group and a typically developing group would reveal more precisely how the NWR and parent ratings could be used to predict BESA performance within and across the two groups. It may be the case that parent ratings would

be lower for the clinical group, which would allow for more variation in the SLAS parent ratings and this could lead to higher levels of association. Subgroups of clinical participants should also be explored in future studies. Little research has been conducted with bilingual children who have other impairments, such as ADHD, autism, Down Syndrome, or development delay. Research investigating the role of mixed dominance in bilingual assessment of children reflecting a more diverse array of linguistic and non-linguistic impairments, is warranted.

APPENDIX A

DOCUMENTS

A.1 Parent Directions

Introductory Scenario: "We are going to use a scale from one to seven. First we will practice using the scale. On a scale from one to seven, one being very cold, four being comfortable and seven being very hot, rate the temperature where you are right now. Lets practice one more. Tell me how tall your child is on a scale from one to seven. One is very short, four is normal or average, and seven is very tall. Remember you can use numbers like two and five."

"Now I would like for you to describe the language abilities of your child. First we will talk about how he or she is speaking in Spanish. Please rate your child's Spanish and social skills, compared to other children the same age. I want you to rate your child from one to seven. One is very low, he or she is not at the same skill level as other children, four is normal or just like other children his or her age, and seven is skill level above average children his or her age. If you do not know just tell me."

A.2 Speech and Language Assessment Scale (Hadley and Rice, 1993)

Please rate your child's language and social skills compared to other children his or her age.

1. My child's ability to ask questions properly is:

1	2	3	**4**	5	6	**7**
very low			normal for age			very high

2. My childs ability to answer questions properly is:

1	2	3	**4**	5	6	**7**
very low			normal for age			very high

3. My childs ability to say sentences clearly enough to be understood by strangers is:

1 2 3 **4** 5 6 **7**

very low normal for age very high

4. The number of words my child knows is:

1 2 3 **4** 5 6 **7**

very low normal for age very high

5. My childs ability to use his/her words correctly is:

1 2 3 **4** 5 6 **7**

very low normal for age very high

6. My childs ability to get his/her message across to others when talking is:

1 2 3 **4** 5 6 **7**

very low normal for age very high

1 2 3 **4** 5 6 **7**

very low normal for age very high

7. My childs ability to use the proper words when talking to others is:

1 2 3 **4** 5 6 **7**

very low normal for age very high

8. My childs ability to get what he/she wants by talking is:

1 2 3 **4** 5 6 **7**

very low normal for age very high

9. My childs ability to start a conversation, or start talking with other children is:

1 2 3 **4** 5 6 **7**

very low normal for age very high

10. My childs ability to keep a conversation going with other children is:

1 2 3 **4** 5 6 **7**

very low normal for age very high

11. The length of this childs sentences is:

1 2 3 **4** 5 6 **7**

very low normal for age very high

12. My childs ability to make "grown up" sentences is:

1 2 3 **4** 5 6 **7**

very low normal for age very high

13. My childs ability to correctly say the sounds in individual words is:

1 2 3 **4** 5 6 **7**

very low normal for age very high

"Now we will answer the same questions regarding your child's language skills in English. Please rate your child's Spanish and social skills, compared to other children the same age. I want you to rate your child from one to seven. One is very low, he or she is not at the same skill level as other children, four is normal or just like other children his or her age, and seven is skill level above average children his or her age. If you do not know just tell me."

A.3 Parent directions translated into Spanish

"Vamos a usar una escala de 1-7. Primero vamos a usar la escala para practicar. En una escala de uno a siete uno es el mas frio, cuatro es comfortable, siete es el mas caliente, estima la temperatura donde se encuentra ahora.Vamos a tratar otro. Ahora digame que altura tiene su nino en una escala de uno a siete. Uno es muy bajo, cuatro es normal, y siete es muy alto. Recuerda que puede usar numerous como dos o cinco."

"Ahora quiero que usted me diga las habilidades del idioma de su hijo. Empezaremos con cómo está hablando en español. Por favor califique el idioma español de su hijo y las habilidades sociales, comparado con otros niños de su propia edad. Quiero que usted califique a su hijo de one a seven. Uno es muy bajo, no se compara para nada al nivel de otros niños, cuatro es normal o justo igual que los niños de su edad; seven es que tiene habilidades muy altas o parece muy maduro en esta área. Si no lo sabe solo digame eso."

A.4 Speech and Language Assessment Scale Translated from Hadley and Rice (1993)

1. La habilidad de mi hijo para hacer preguntas adecuadamente es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

2. La habilidad de mi hijo para responder preguntas adecuadamente es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

3. La habilidad de mi hijo para decir oraciones lo suficientemente claras para que los desconocidos las entiendan es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

4. La cantidad de palabras que mi hijo sabe es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

5. La habilidad de mi hijo de usar sus palabras correctamente es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

6. La habilidad de mi hijo de comunicar su mensaje a otros cuando habla es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

7. La habilidad de mi hijo de usar las palabras adecuadas cuando habla con otros es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

8. La habilidad de mi hijo de conseguir lo que quiere al hablar es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

9. La habilidad de mi hijo de iniciar una conversación, o de empezar a hablar con otros nios es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

10. La habilidad de mi hijo de seguir con una conversación con otros niños es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

11. El largo de las oraciones de este niño es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

12. La habilidad de mi hijo para formar oraciones de adulto es::

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

13. La habilidad de mi hijo para decir correctamente el sonido en las palabras individuales es:

1 2 3 **4** 5 6 **7**

muy bajo normal para su edad muy alto para su edad

"Ahora le haremos estas mismas preguntas sobre las habilidades de inglés de su hijo. Por favor califique el idioma inglés de su hijo y sus habilidades sociales, comparado con otros niños de su propia edad. Quiero que califique a su hijo de 1 a 7. Uno es muy bajo, no se compara para nada al nivel de otros niños, cuatro es normal o justo igual que los niños de su edad; 7 es que tiene habilidades muy altas o parece muy maduro en esta área. Si no lo sabe solo digame eso."

A.5 Parental Permission Document

BACKGROUND

Your child is being asked to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether you will allow your child to take part in this study.

This study is being directed by Jessica Carrizo, B.A., a graduate student in the Department of Communication Sciences and Disorders. It addresses the importance of testing bilingual children in the two languages they speak. Previous studies have found children who speak two languages can have mixed dominance, which means their language skills can be spread across the two languages. A bilingual child may have higher vocabulary skills in Spanish but higher grammar skills in English. One of the goals of this study is to compare parent report of language use to language performance on a standardized test. Another goal of this project is to explore experimental screening measures for bilingual Spanish/English speaking children. To address these goals, students in kindergarten will be asked to participate.

STUDY PROCEDURE

It will take your child approximately 2 hours to complete this study. The testing will take place on two separate days, an English testing day and a Spanish testing day. As part of this study your child will be tested using a standardized language test for bilingual Spanish/English speaking children. Your child will also be given experimental screening tasks, in which your child will be asked to repeat made up words using Spanish and English sounds. Testing will take place at your childs school, your home, or at the University of Utah Child Language Laboratory based on the most convenient location for you and your child. You will be asked to participate in a parent interview, which will take 30 minutes to complete. Three questionnaires will be used for the interview. The first questionnaire will ask you about your childs language history and the other questionnaires will ask you to describe how your child uses the two languages.

RISKS

The risks associated with the testing procedures are not greater than those encountered by children when they receive any hearing, reading, cognitive or behavioral assessment. These risks include loss of time and the possibility that children may experience boredom,

frustration, or fatigue during testing. An experienced examiner will administer all procedures in a child-friendly manner. Prior to testing children will be notified that they can take breaks at any time during the testing or can discontinue testing all together.

BENEFITS

There are no direct benefits for taking part in this study to you or your child. You will receive a summary report of your childs language skills from the standardized test. We hope the information we get from this study may help develop greater understanding of bilingual performance on screening and testing measures.

ALTERNATIVE PROCEDURES

You do not have to give permission for your child to participate.

CONFIDENTIALITY

We will keep all research records that identify your child private to the extent allowed by law. Data and records about your child will be kept locked in filing cabinets or on computers protected with passwords in the University of Utah Child Language Laboratory. Only those who work with this study have access to your childs information. Results of the study may be published; however, your name, your childs name, and other identifying information will be kept private. Your child will be identified by an arbitrary code number on all test forms, data sheets, audiotapes, and transcriptions.

PERSON TO CONTACT

If you have questions, complaints or concerns about this study, you can contact the investigator, Jessica Carrizo by phone at XXX or by email at XXX.

Institutional Review Board: Contact the Institutional Review Board (IRB) if you have questions regarding your rights as a research participant. Also, contact the IRB if you have questions, complaints or concerns, which you do not feel you, can discuss with the investigator. The University of Utah IRB may be reached by phone at (801) 581-3655 or by e-mail at irb@hsc.utah.edu.

Research Participant Advocate: You may also contact the Research Participant Advocate (RPA) by phone at (801) 581-3803 or by email at participant.advocate@hsc.utah.edu.

VOLUNTARY PARTICIPATION

It is up to you to decide whether or not to allow your child to participate in this study. If you decide your child you can tell us that you dont want your child to be in this study. Your child can start the study and then choose to stop the study later. This will not affect your relationship with the investigator.

COSTS AND COMPENSATION TO PARTICIPANTS

There are no costs or compensation for this study.

CONSENT

By signing this consent form, I confirm I have read the information in this parental permission form and have had the opportunity to ask questions. I will be given a signed copy of this parental permission form. I voluntarily agree to allow my child to take part in this study.

_____

Name of Child

_____

Name of Parent/Guardian

_____ _____

Parent/Guardian Signature Date

_____

Relationship to Child

_____

Name of Person Receiving Consent

_____ _____

Signature of Person Receiving Consent Date

A.6 Parent Permission Document Translated into Spanish

ANTECEDENTES

Su niño esta siendo llamado para participar en un estudio. Antes de que usted decida, es importante entender el motivo de esta investigación y que es lo que involucrará. Por favor tome su tiempo para leer la información cuidadosamente. Pregúntenos si tiene alguna duda o si le gustaría tener más información. Tómese el tiempo necesario para decidir si está de acuerdo en que su hijo participe en este estudio.

Este estudio es dirigido por Jessica Carrizo, B.A., estudiante graduada del Departamento de Ciencia de la Comunicación y Desordenes. Este estudio aborda la importancia de evaluar a los niños que hablan más de una idioma. Estudios anteriores han demostrado que los niños que hablan más de un idioma pueden tener una influencia mixta, lo cual significa que su habilidades lingüísticas puede estar disperso entre los dos idiomas. Un niño bilingüe puede tener un mejor vocabulario en español, pero entender mejor la gramática en inglés. Uno de los objetivos de este estudio es comparar el reporte de los padres del idioma usado, con el rendimiento en una prueba estandarizada. Otro objetivo de este proyecto es explorar medidas de investigación experimental para nios que hablán mas de un idioma. Para lograr con estos objetivos, niños de kindergarten serán invitados para participar en el estudio.

PROCESO DE ESTUDIO

Este estudio le tomará a su hijo(a) aproximadamente 2 horas para ser completado. La prueba se será tomada en 2 días separados, un día de para la prueba en inglés y otro para la prueba en español. Como parte de este estudio, su hijo(a) será examinado usando una prueba estandarizada para niños que hablan español e inglés. A su hijo(a) le entregarán tareas de proyección experimentales, en las cuales se le pedirá a su hijo(a) repetir palabras inventadas usando sonidos en español e inglés. La prueba será tomada en la escuela de su hijo(a), su casa o en el Laboratorio de Lenguaje de la Universidad de Utah de acuerdo al lugar que sea ms conveniente para usted y su hijo(a). A usted se le requerirá participar en una entrevista de padres, la cual toma 30 minutos en ser completada. Tres cuestionarios serán usados para la entrevista. El primer cuestionario le consultará sobre la historia del lenguaje de su hijo(a) y los otros cuestionarios le pedirán describir como su hijo(a) usa ambos lenguajes.

RIESGOS

Los riesgos asociados con los procedimientos de estas pruebas no son mayores que los encontrados cuando los niños reciben cualquier evaluación de audición, lectura, cognitiva o de conducta. Esos riesgos incluyen perdida de tiempo y la posibilidad de que los niños puedan experimentar aburrimiento, frustración, o fatiga durante las pruebas. Todos los procedimientos serán administrados por un examinador experimentado de una manera divertida para los niños. Antes de empezar con las pruebas se les notificará a los niños que pueden tomar descansos o descontinuar la prueba en cualquier momento.

BENEFICIOS

No hay beneficios directos por participar en este estudio para usted o su hijo(a). Usted recibirá un reporte con el resumen de los resultados de la prueba de su hijo(a). Nosotros esperamos que la información que obtengamos de este estudio nos pueda ayudar a desarrollar un mayor entendimiento de rendimiento bilingüe de (en) herramientas y medidas.

PROCEDIMIENTOS ALTERNATIVOS

Usted no tiene que dar permiso para que su niño participe.

CONFIDENCIALIDAD

Nosotros mantendremos todos los documentos que identifican a su niño de manera confidencial al extremo permitido por la ley. Los datos y registros de su hijo(a) se mantendrán bloqueado en archivadores o en computadoras protegidas con contraseñas en el Laboratorio de Lenguaje de Niños de la Universidad de Utah. Solo las personas que trabajan en este estudio tienen acceso de la información de su niño. Los resultados del estudio pueden estar publicados; sin embargo, su nombre, el nombre de su hijo(a), y cualquier otra información de identificación será mantenido privado. Su hijo(a) será identificado con un código arbitrario en todas las pruebas, hojas de datos, grabaciones y transcripciones.

LA PERSONA DE CONTACTO

Si usted tiene preguntas, problemas, o preocupaciones acerca con este estudio, se puede poner en contacto con la investigadora, Jessica Carrizo por telfono a XXX o por correo electrónico a XXX.

Junta de Revisión Institucional: Se puede poner en contacto con la Junta de Revisión Institucional (Institutional Review Board-IRB)- si tienes preguntas sobre sus derechos como participante en la investigación. Además, póngase en contacto con ellos si tienes preguntas, problemas, o preocupaciones en que no te sientes que puedes discutir con la investigadora. Se puede poner en contacto con la Junta de Revisión Institucional de la Universidad de Utah (Institutional Review Board-IRB) por teléfono a (801) 581-3655 o por correo electrónico a irb@hsc.utah.edu.

El Abogado del Participante en la Investigación: Se puede poner en contacto con el abogado participante en la investigación (Research Participant Advocate-RPA) por teléfono a (801) 581-3803 o por correo electrónico a participant.advocate@hsc.utah.edu.

PARTICIPACIÓN VOLUNTARIA

Es su decisión si permite o no que su hijo(a) participe en este estudio. Si usted lo decide, puede decirnos que no quiere que su hijo(a) participe en este estudio. Su hijo(a) puede empezar el estudio y decidir abandonar el estudio cuando sea. Esto no afectará su relación con la investigadora.

GASTOS Y EL PAGO DE INDEMNIZACIN A LOS PARTICIPANTES

No hay ningún costo o indemnización para este estudio.

EL CONSENTIMIENTO

Al firmar este formulario de consentimiento, yo confirmo que he leído la información en este documento de consentimiento de los padres y he tenido la oportunidad de hacer preguntas. Me darán una copia firmada de esta autorización de los padres. Estoy de acuerdo que mi hijo(a) participe en este estudio.

_____

Nombre del niño

_____

Nombre de un padre/guardián

_____ _____

Firma de un padre/guardin La fecha

_____

Relación con el niño

_____

Nombre de la persona que recibe el consentimiento

_____ _____

Firma de la persona que recibe el consentimiento La fecha

APPENDIX B

INDIVIDUAL PROFILES

Table B.1. Best Performance Across Measures

	NWR		BESA						ITALK	
Part	PPC		Phonology		Morphology		Semantics		Parent Rating	
	Span	Eng	Span	Eng	Span	Eng	Span	Eng	Span	Eng
1	X			X		X	X			X
2	X			X		X	X		X	
3		X		X		X		X		X
4	X			X		X		X	X	X
5	X		X			X	X			X
6	X			X		X	X		X	X
7	X			X		X		X		X
8	X		X	X		X		X	X	X
9	X			X	X			X	X	X
10	X		X	X	X		X		X	
11		X	X			X		X		X
12		X	X			X	X		X	
13	X		X	X		X	X		X	X
14	X		X			X		X		X
*15	X		X		X		X		X	
*16	X		X		X		X			X
17	X		X	X		X	X		X	
18	X			X		X		X		X
19	X		X	X	X	X	X			X
20	X	X		X		X		X		X
21		X		X		X		X		X
22		X		X	X		X		X	
23	X			X		X	X		X	
*24	X			X		X		X		X
25	X			X		X		X		X
26		X		X		X		X		X

Note: Part-participant, NWR-nonword repetition, BESA-Bilingual English Spanish Assessment, ITALK- Inventory to Assess Language Knowledge, Span-Spanish, Eng-English.
*Participants- 15, 16, 24 receiving speech and language services at the time of the study.

Table B.2. Nonword Repetition Performance

Participant	NWR-Span	NWR-Eng	NWR-Best	NWR-U
1	88	81	88	83
2	85	78	85	**88**
3	77	82	82	**89**
4	92	79	92	**96**
5	84	80	84	**94**
6	72	59	72	**90**
7	97	83	97	96
8	87	84	87	**90**
9	90	82	90	**91**
10	69	60	69	**76**
11	81	85	85	**97**
12	72	79	79	**88**
13	98	83	98	93
14	85	83	85	**94**
*15	51	29	51	51
*16	57	51	57	**62**
17	83	79	83	**86**
18	91	78	91	**96**
19	83	80	83	**92**
20	90	90	90	**94**
21	73	75	75	**86**
22	65	68	68	**81**
23	82	65	82	78
*24	58	55	58	**82**
25	93	91	93	**96**
26	75	82	82	**86**

Note: NWR-Span- Spanish nonword repetition task, NWR-Eng- English nonword repetition task, NWR-U- universal nonword repetition task. Scores with red shading are the participants' best scores. Scores with grey shading are the participants whose NWR-U score was higher than their NWR-best score.

*Participants- 15, 16, 24 receiving speech and language services at the time of the study.

Table B.3. BESA Performance

Participant	Phon S	Phon E	Morph S	Morph E	Sem S	Sem E	LIS
1	105	120	88	98	95	88	97
2	105	120	70	103	108	105	105
3	-	120	-	105	-	108	106
4	110	120	100	108	120	128	118
5	16	85	58	110	100	120	115
6	90	115	88	98	105	98	101
7	115	120	105	108	108	113	110
8	115	115	90	113	115	118	116
9	115	120	113	110	100	113	113
10	95	95	83	70	108	90	95
11	100	80	100	108	113	115	111
12	105	90	93	98	108	105	103
13	115	115	90	98	113	110	105
14	100	120	65	110	98	105	108
*15	80	-	58	-	85	-	71
*16	110	80	58	62	80	90	75
17	115	115	90	103	113	85	108
18	-	125	-	113	-	113	113
19	105	105	98	98	120	115	109
20	-	90	-	115	-	120	117
21	95	105	68	88	103	108	98
22	105	115	93	80	100	93	96
23	90	115	62	88	83	78	84
*24	-	75	-	70	-	78	74
25	115	120	98	110	110	120	115
26	-	120	-	118	-	123	120

Note: Phon S- Spanish phonology subtest, Phon E- English phonology subtest, Morph-S- Spanish morphosyntax subtest, Morph-E- English morphosyntax subtest, Sem S- Spanish semantics subtest, Sem E- English semantics subtest, LIS- langue index score. Scores with red shading are the participants' best scores. LIS scores with grey shading are children who scored two standard deviations below the mean.

*Participants- 15, 16, 24 receiving speech and language services at the time of the study.

Table B.4. Parent Ratings

Participant	ITALK S	ITALK E	SLAS S	SLAS E
1	3.8	4.2	4	4
2	4.6	4.5	5	6
3	2	4.8	2	6
4	4.2	4.2	4	4
5	3.8	4.8	4	4
6	4.8	4.8	4	-
7	5	4.4	6	3
8	5	5	4	5
9	4.8	4.8	6	6
10	4.4	-	4	-
11	4.4	5	6	6
12	4	3.6	4	4
13	4.4	4.4	5	4
14	2.2	5	2	4
*15	4	2.8	3	2
*16	2.2	3	3	4
17	4.4	3.7	3	3
18	3.2	5	3	7
19	4.4	4.8	4	4
20	3.4	4.6	2	5
21	4	4.4	5	5
22	4.2	3.6	3	3
23	4.6	4.4	4	4
*24	2.5	3	2	3
25	4.6	5	6	7
26	3.6	5	4	7

Note: ITALK S- Inventory to Access Language Knowledge Spanish, ITALK E- Inventory to Access Language Knowledge English, SLAS S- Speech Language Assessment Scale Spanish, SLAS E- Speech Language Assessment Scale English. Red shading is the participant's best ITALK score and grey shading is the participant's best SLAS score. ITALK rating scale is 1-5 with 3 being sometimes, 1 never, and 5 always. SLAS rating scale is 1-7 with 4 being average compared to typically developing peers, 1 very below peers, and 7 very above peers.

*Participants- 15, 16, 24 receiving speech and language services at the time of the study.

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